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by
M. P. Carlson



NEBRASKA GEOLOGICAL SURVEY
REPORT OF INVESTIGATIONS NO. 3

LOAN COPY

Conservation & Survey Division
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The UNIVERSITY OF NEBRASKA
CONSERVATION and SURVEY DIVISION

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Distribution and Subdivision of Precambrian and Lower and Middle Paleozoic Rocks In the Subsurface of Nebraska

Detailed sample examination provides the data for delineation of lithostratigraphic units of the Precambrian through Mississippian rocks in Nebraska's subsurface. The extent, thickness, lithology, and stratigraphic relations of these units suggest equivalency with rocks outcropping in adjoining states. The terminology applied in these states has been informally illustrated to allow regional interpretation. The figures included in this report were submitted as a dissertation to the Department of Geology, University of Nebraska (Carlson, 1969). The graphic logs and typed sample descriptions prepared for this investigation are on file at the Nebraska Geological Survey.

Nebraska is mantled by a variable thickness of Pleistocene and Tertiary sediments, except for localized valley-side outcrops of Cretaceous, Permian, and Pennsylvanian sediments. The regional bedrock geology of the area including Nebraska is illustrated on Figure 1. Rocks ranging in age from Precambrian to Recent are present within Nebraska but there is a great variation in the sequence present in any specific area because of nondeposition and erosion.

The principal structural features of Nebraska are shown on Figure 2. Major movement on many of these features occurred in Early Pennsylvanian time and thus these features had little influence on the pre-Pennsylvanian depositional pattern. Most of the structures are apparent on the Precambrian surface (Figure 3); however, many of the irregularities on this surface are interpreted as being paleotopographic features of various ages.

The general distribution of rock type at the Precambrian surface is shown on Figure 4. These patterns were delineated by considering: (1) the available samples and the configuration map (Carlson, 1967), (2) the stratigraphic relations with overlying rocks, (3) the available radiometric ages (Figure 5), and (4) the trends suggested by both the gravity data (Figure 6) and the magnetic data (Figure 7). No formal terminology has been applied to the subdivision of the Precambrian within Nebraska. However, the Sioux Quartzite extends into northeastern Nebraska and the Keweenaw Basalts and associated sediments are present in eastern Nebraska.

Figures 8 through 17 show the subdivisions and distribution of the Cambrian, Ordovician, Silurian, Devonian, and Mississippian rocks in the subsurface of Nebraska. These rocks have been subdivided into lithostratigraphic units which do not necessarily have time significance but do furnish a framework within which geologic history can be reconstructed. Tentative correlations were made with formally defined units in adjacent states. All of the present zero edges illustrated on the thickness maps are erosional features.

A better understanding of the Precambrian-Paleozoic relationships can be obtained by combining the various thickness maps. Figure 18 is a suprageologic map or "worm's-eye" view of the age of the rocks immediately overlying the Precambrian surface. This illustration shows the overlap of Middle Ordovician

rocks onto the Southeast Nebraska Arch and the Siouxana Arch. The major unconformity at the base of the Pennsylvanian is revealed by the truncation and absence of pre-Pennsylvanian rocks.

The paleogeologic map at the base of the Pennsylvanian (Figure 19) shows extensive areas of Precambrian rock. Uplift in the Early Pennsylvanian along the Chadron and Cambridge Arches and the Nemaha Uplift resulted in removal of progressively older Paleozoic rocks toward the crest of these structures. The thicker sections of these older Paleozoic rocks are preserved in the present-day structural basins.

The figures included in this report illustrate the Precambrian and Lower and Middle Paleozoic stratigraphic patterns in the subsurface of Nebraska. It is anticipated that within this framework detailed economic or technical studies of local areas and/or specific rock units can be more easily accomplished.

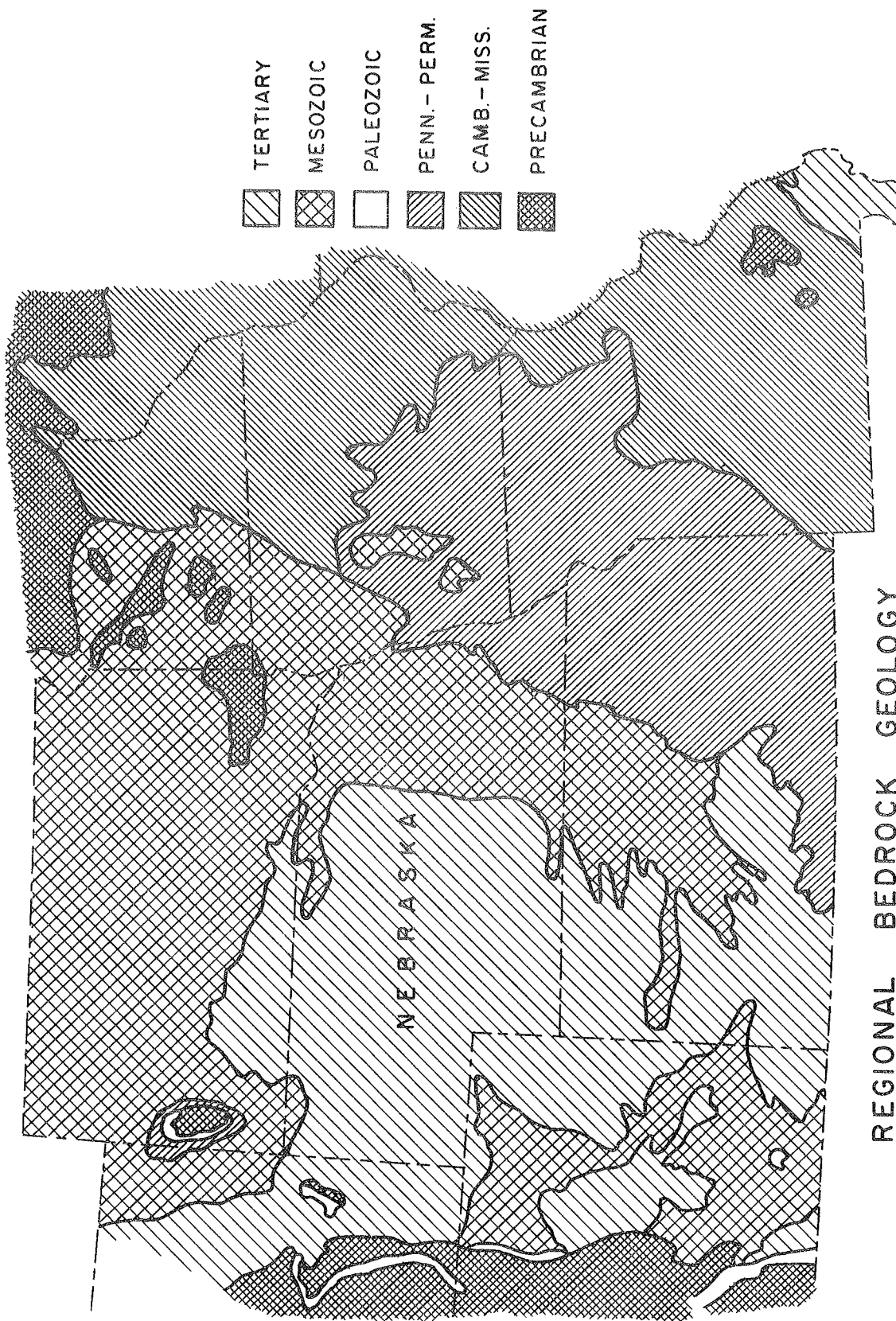
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LIST OF ILLUSTRATIONS

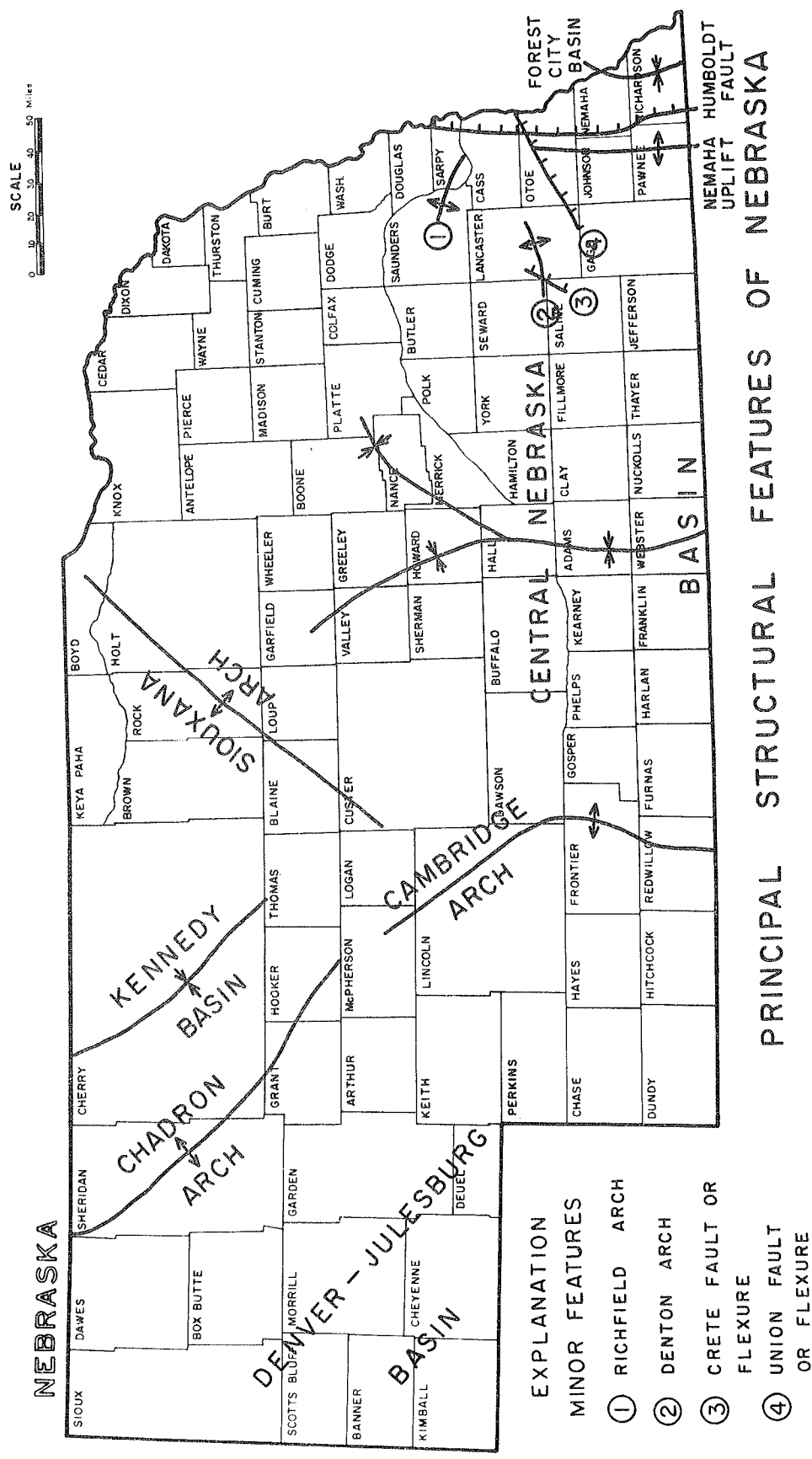
- FIGURE 1 Regional Bedrock Geology
- FIGURE 2 Principal Structural Features of Nebraska
- FIGURE 3 Configuration of the Precambrian Surface
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- FIGURE 18 Suprageologic Map of the Precambrian Surface
- FIGURE 19 Paleogeologic Map—Base of Pennsylvanian



REGIONAL BEDROCK GEOLOGY

(After Kinney, 1966)

Figure 1

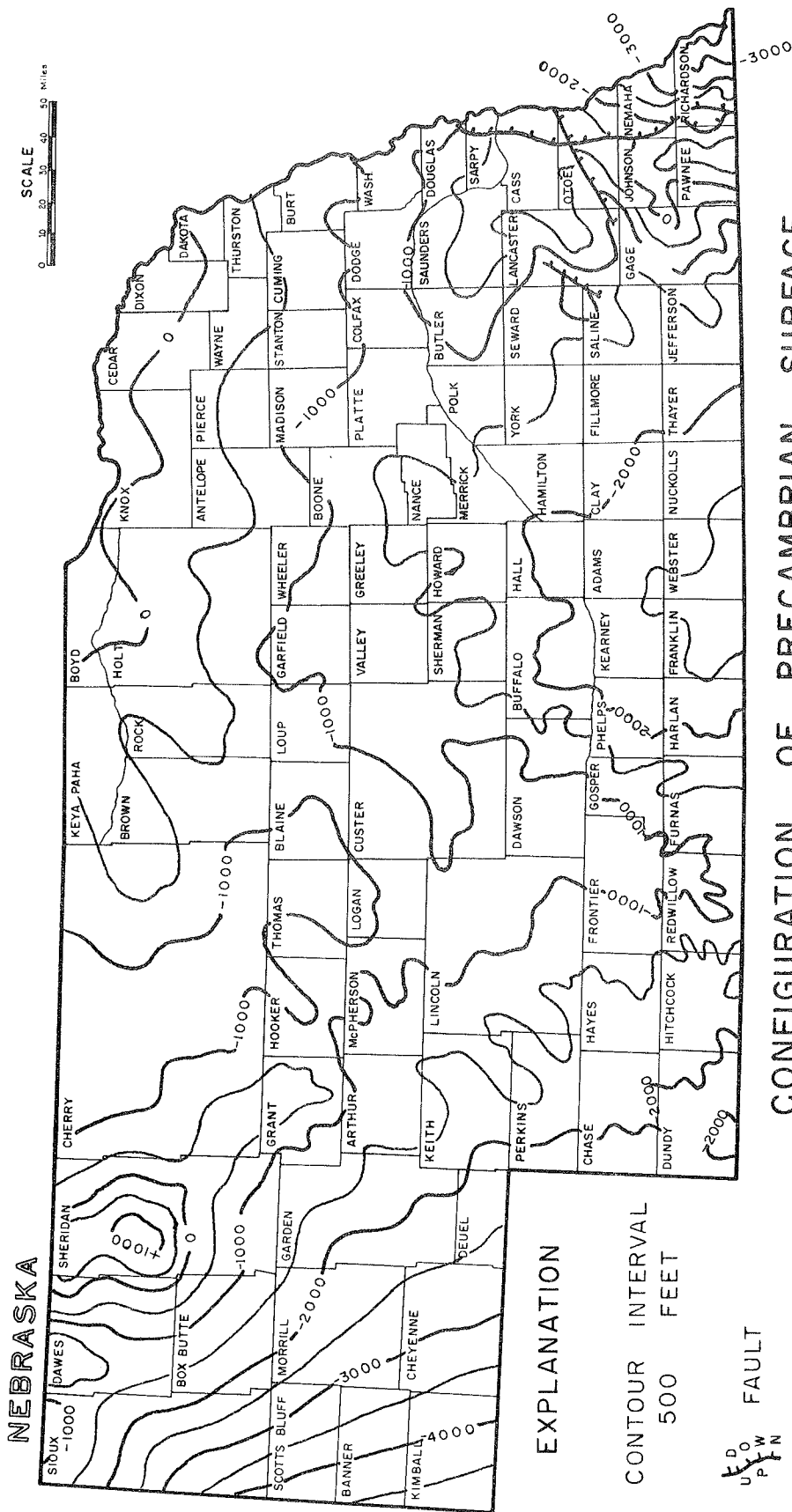


PRINCIPAL STRUCTURAL FEATURES OF NEBRASKA

MARVIN P. CARLSON

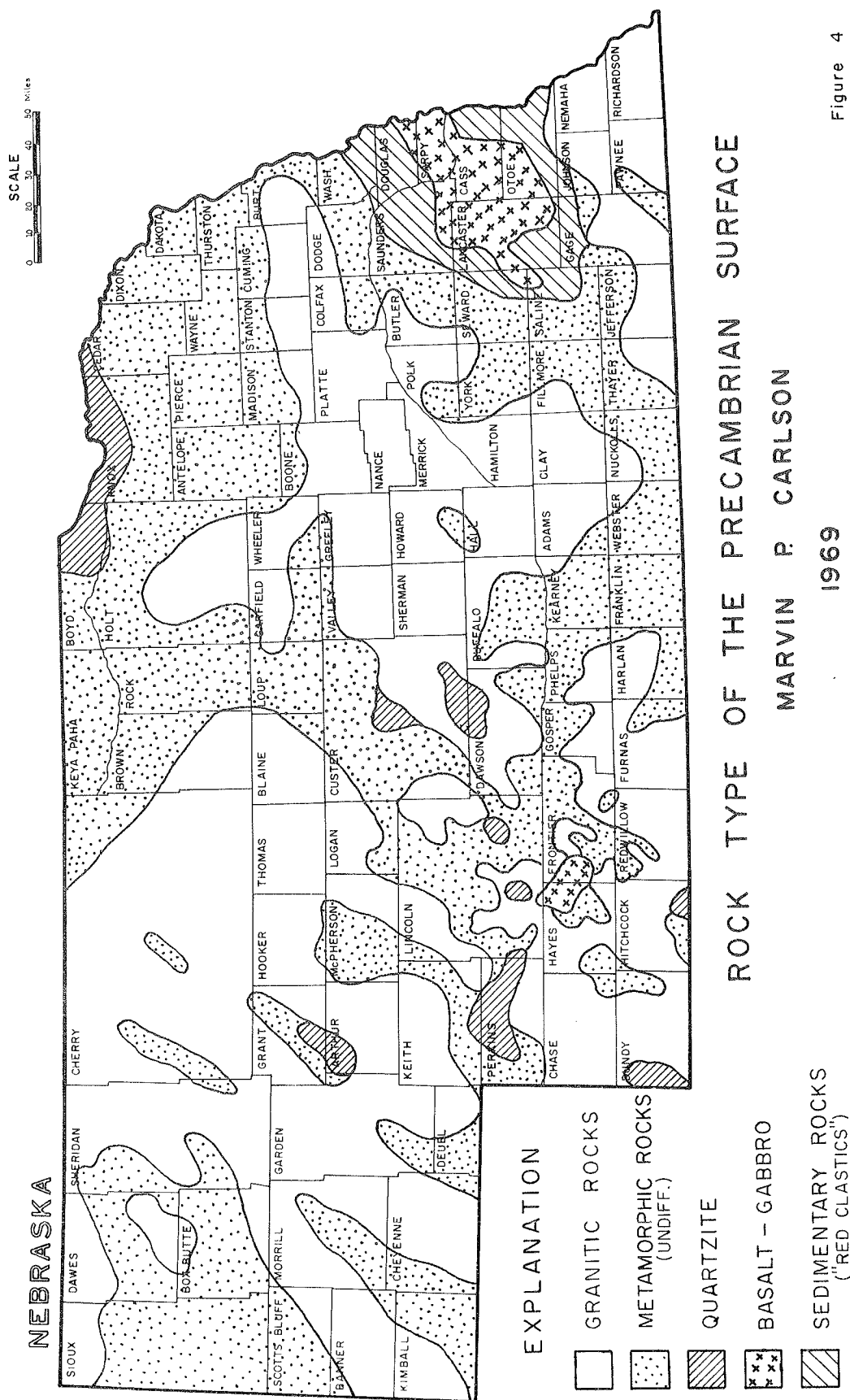
1969

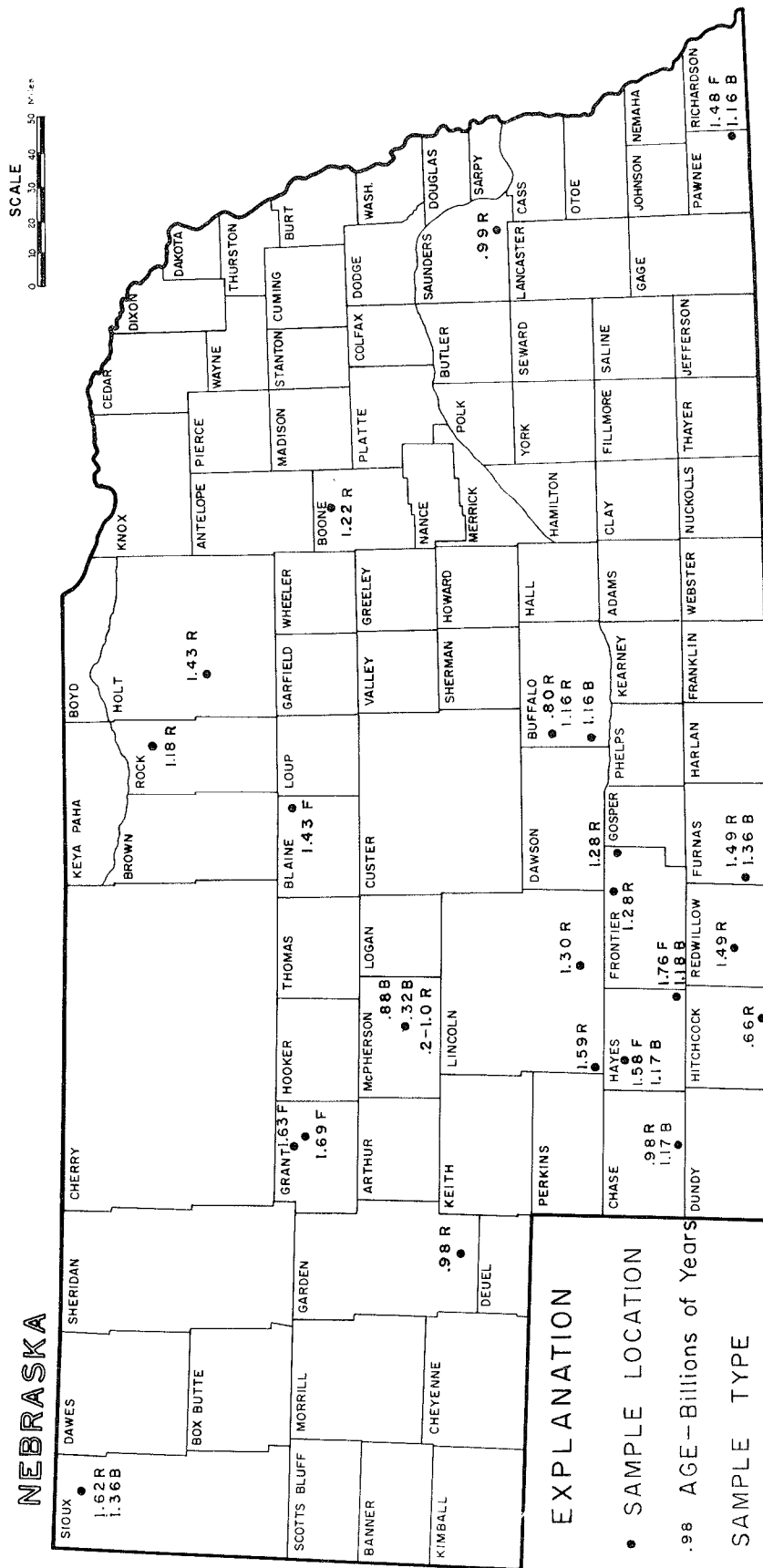
Figure 2



CONFIGURATION OF PRECAMBRIAN SURFACE
(AFTER CARLSON, 1967)

Figure 3





RADIOMETRIC AGES OF BASEMENT ROCK
(From Goldich and others, 1966)

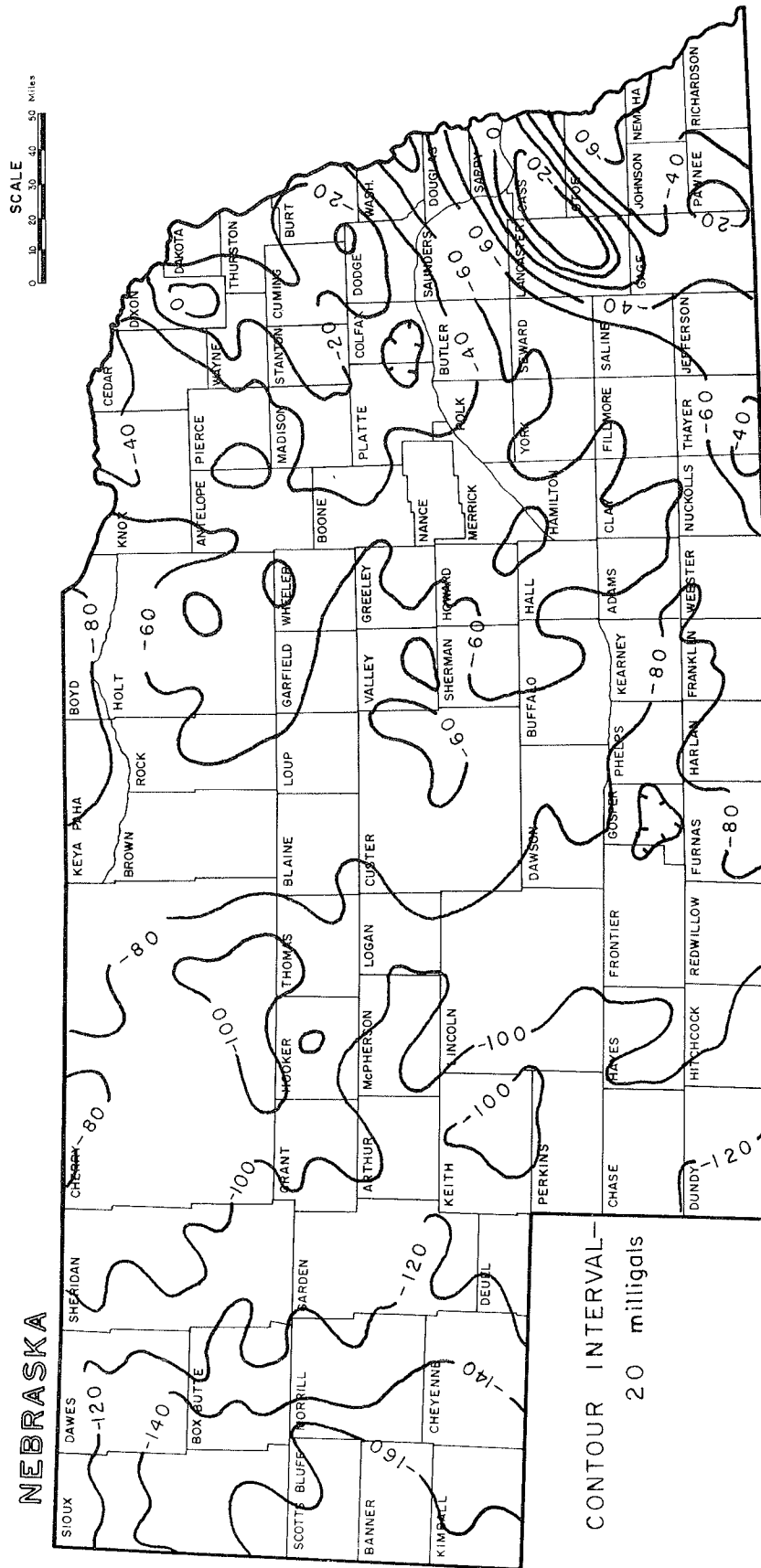
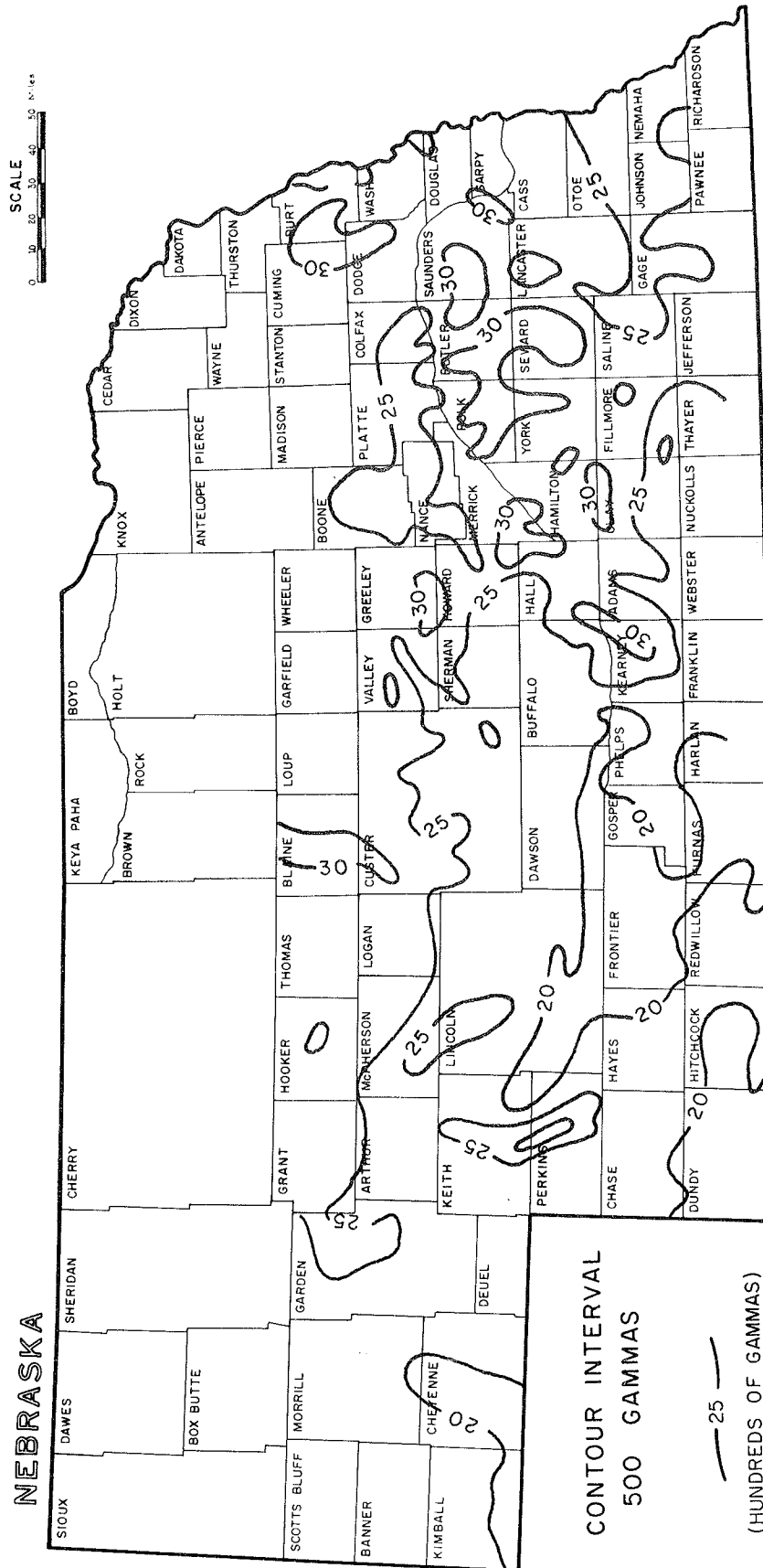
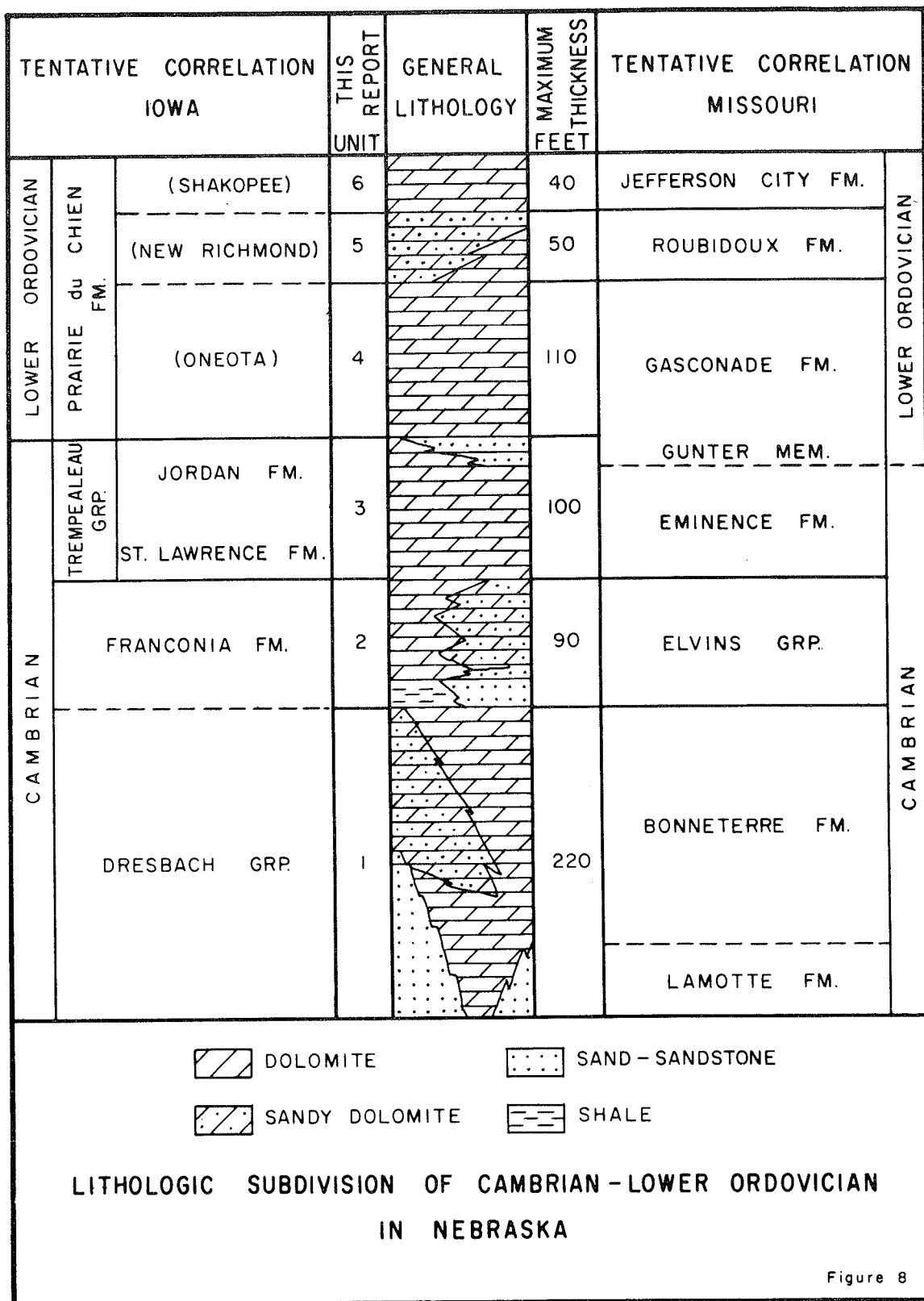


Figure 6



(From Zeitz and others, 1966)



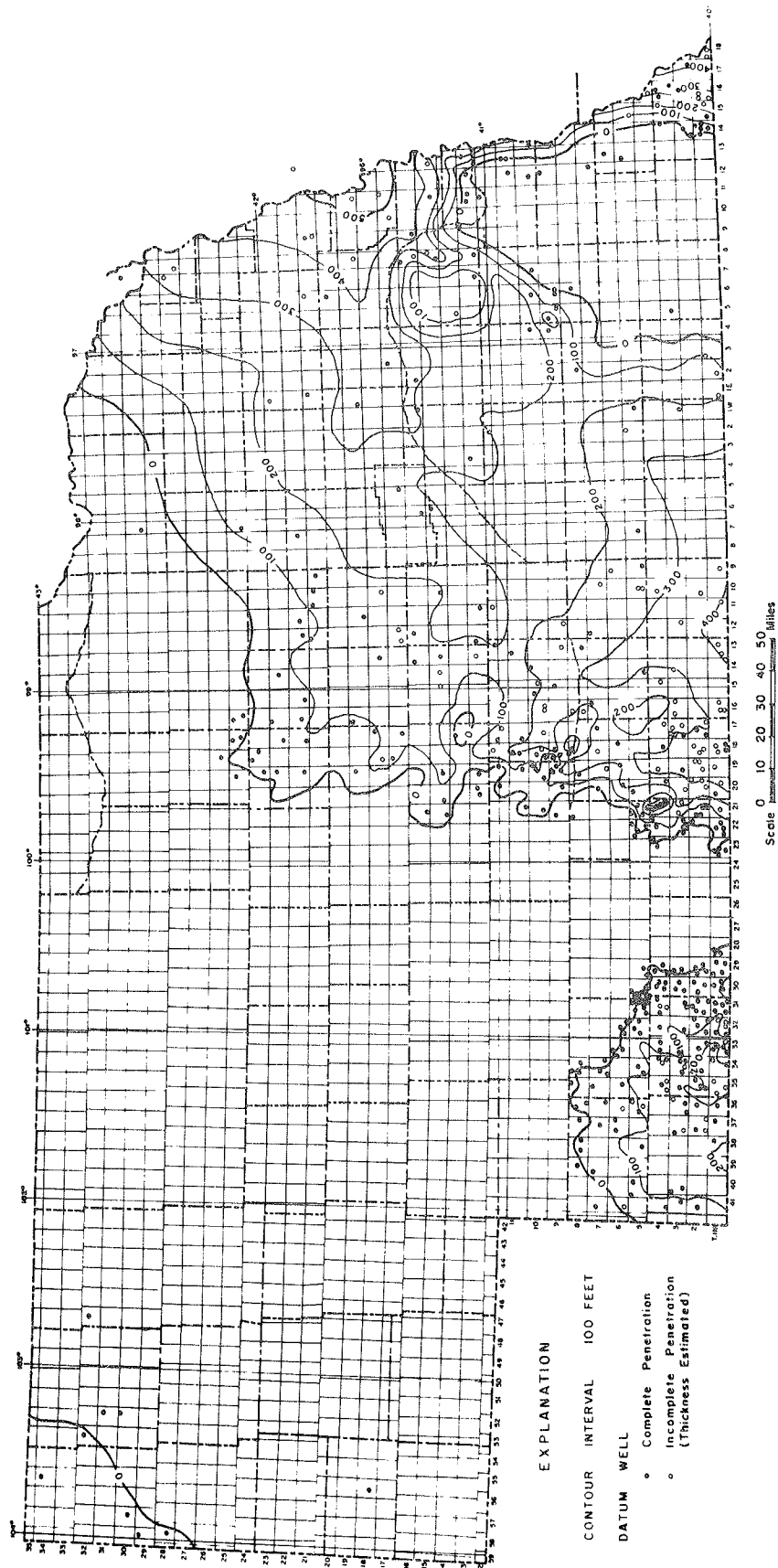


Figure 9

THICKNESS MAP OF CAMBRIAN-LOWER ORDOVICIAN

Marvin P. Carlsson
1969

TENTATIVE CORRELATION IOWA		UNIT THIS REPORT	GENERAL LITHOLOGY	MAXIMUM THICKNESS FEET	SUBSURFACE CORRELATION SOUTHERN MID CONTINENT
MAQUOKETA FM.		UPPER	7	140	MAQUOKETA - SYLVAN
GALENA FM.	DUBUQUE	AND	6	120	VIOLA- KIMMSWICK
	STEWARTVILLE -PROSSER	MIDDLE	5	75	
			4	50	
			3	80	
		UPPER	2	60	
			1	60	
DECORAH FM.	ION	MIDDLE	7	20	SIMPSON
	GUTTENBERG		6	40	
	SPECHTS FERRY		5	20	
PLATTEVILLE FM.	Mc GREGOR		4	15	
	PECATONICA		3	15	
			2	30	
(GLENWOOD ?) ST. PETER		LOWER	1	100	(ST. PETER)



DOLOMITE

SNALY
CHERTY
SANDY



SAND



LIMESTONE



SHALE

DOLOMITIC

LITHOLOGIC SUBDIVISIONS OF MIDDLE AND UPPER ORDOVICIAN
IN NEBRASKA

Figure 10

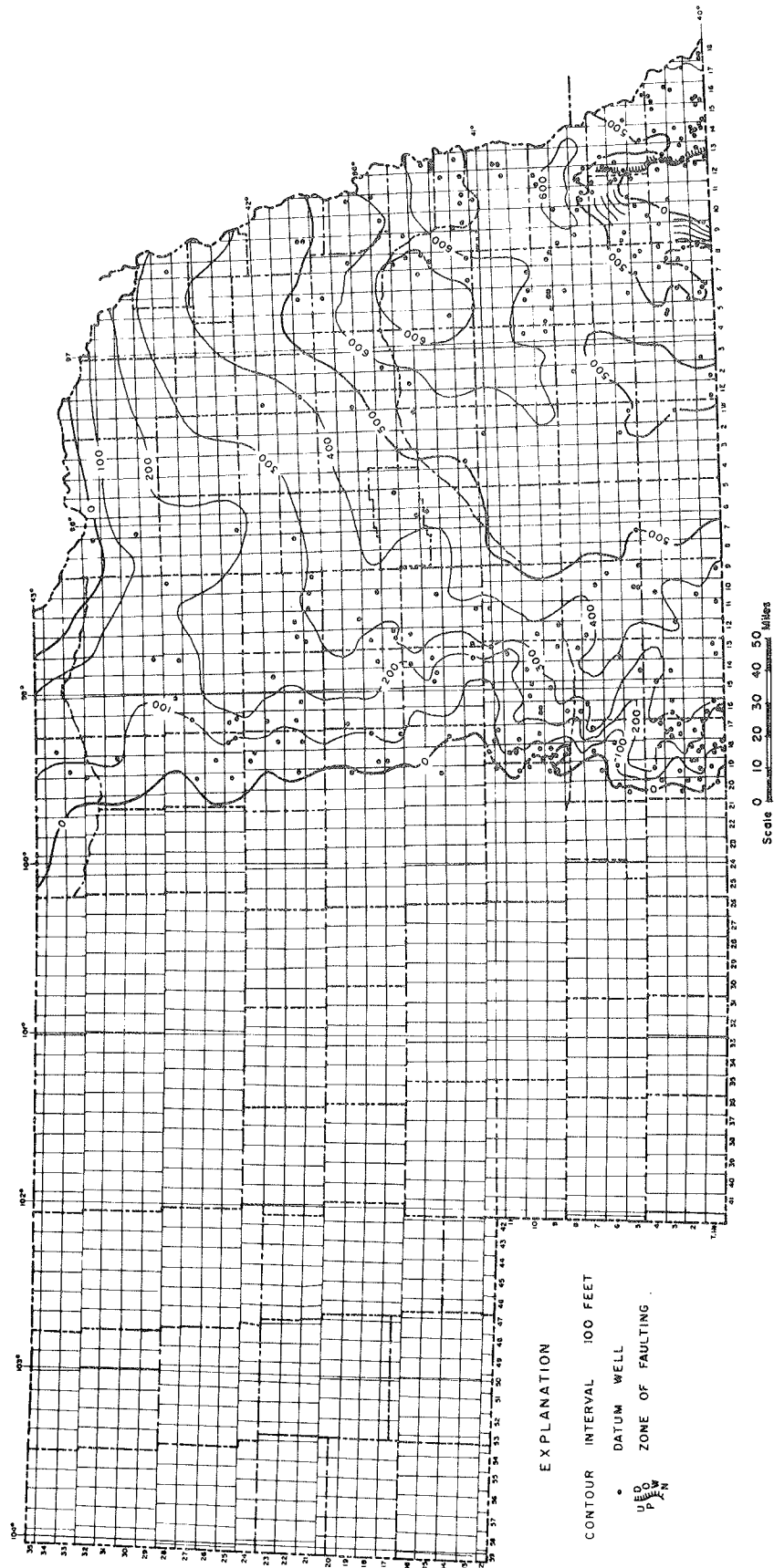
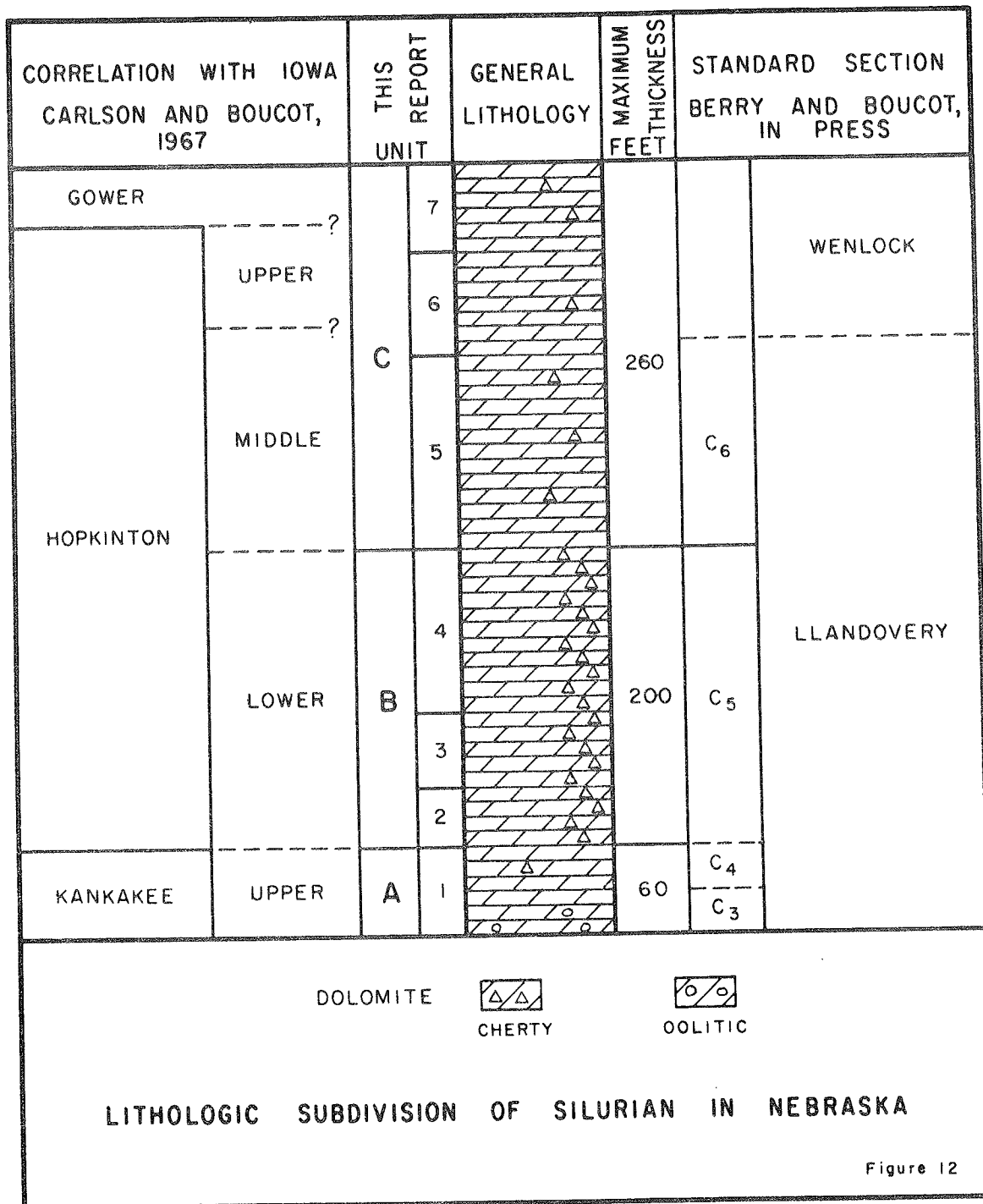


Figure 11

THICKNESS MAP OF MIDDLE AND UPPER ORDOVICIAN

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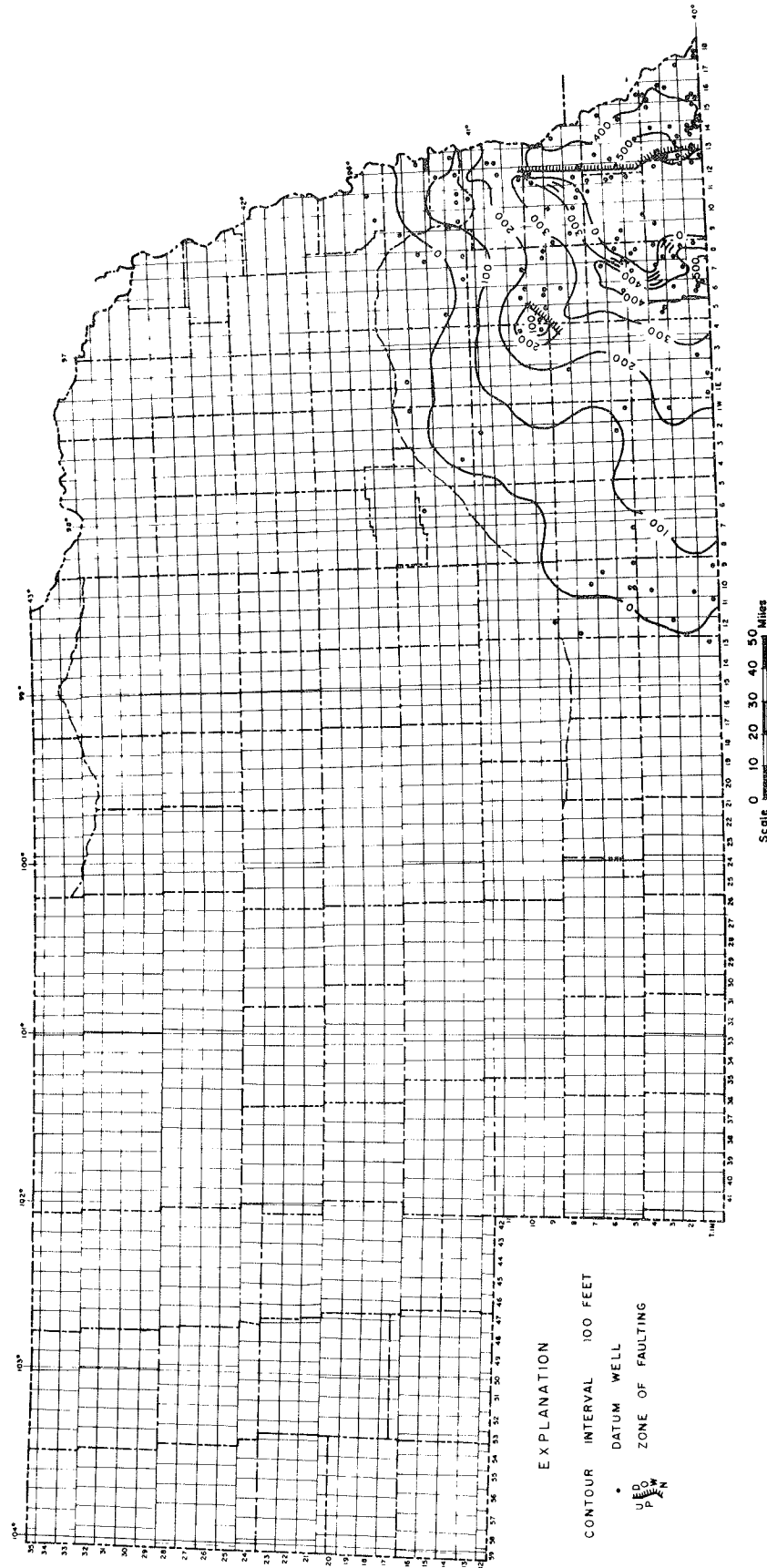


Figure 13

THICKNESS MAP OF SILURIAN

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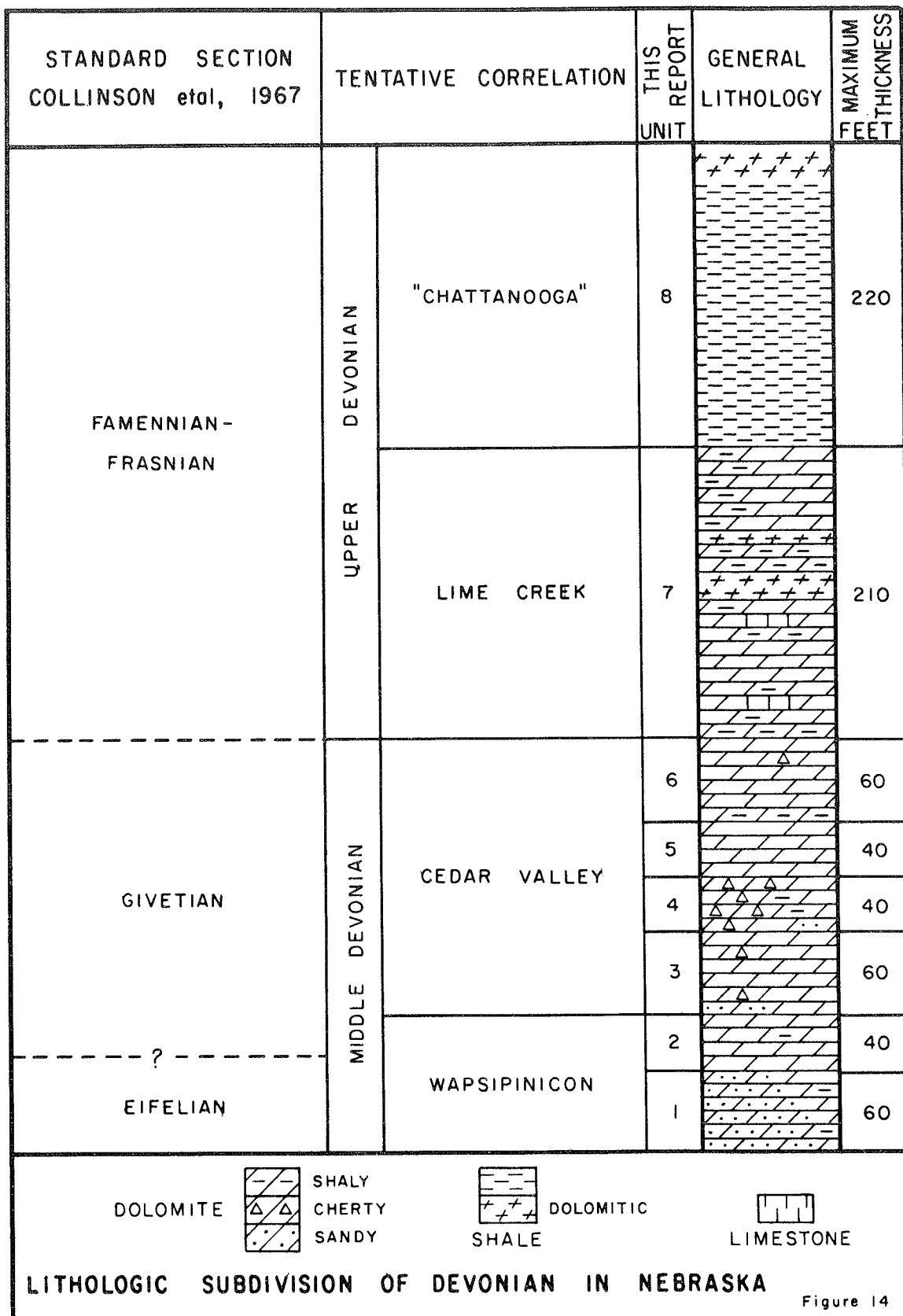


Figure 14

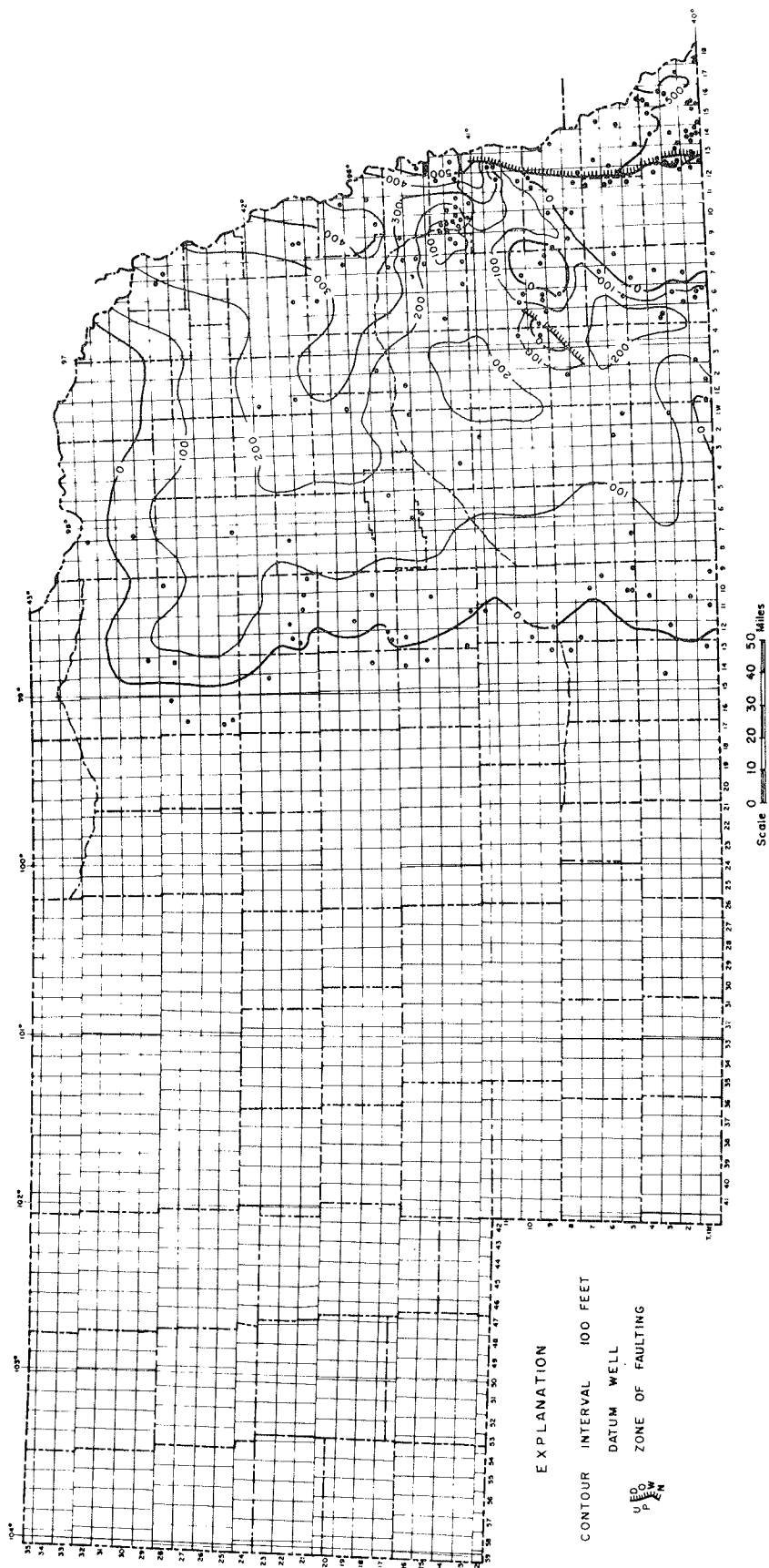


Figure 15

THICKNESS MAP OF DEVONIAN

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SYSTEM	SERIES	GROUP/FORMATION		UNIT THIS REPORT		LITHOLOGY	THICKNESS IN FEET
MISSISSIPPIAN	MERAMECIAN	STE. GENEVIEVE		9			0 - 25
		ST. LOUIS		8			0 - 30
		SPERGEN		7			0 - 35
		WARSAW		6			0 - 50
	OSAGEAN	UPPER KEOK. — BURL.		5			0 - 65
		LOWER KEOK. — BURL.		4			0 - 50
	KINDERHOOKIAN	GILMORE CITY		3			0 - 85
		CHOUTEAU-HAMPTON GROUP	EAGLE CITY-IOWA FALLS	2	D		0 - 100
			MAYNES CREEK (WASSONVILLE)		C		0 - 50
			CHAPIN (COMPTON)		B		0 - 20
UNNAMED SILTSTONE			A			± 5	
BOICE		1			0 - 100		
DEVONIAN		"CHATTANOOGA"		0		0 - 230	

EXPLANATION

LIMESTONE		SAND EMBEDDED OOLITIC	SHALE		"OOLITIC" HEMATITE
DOLOMITE		CHERTY GLAUCONITIC	SILTSTONE- SANDSTONE		DOLOMITIC

LITHOLOGIC SUBDIVISION OF MISSISSIPPIAN IN NEBRASKA

Figure 16

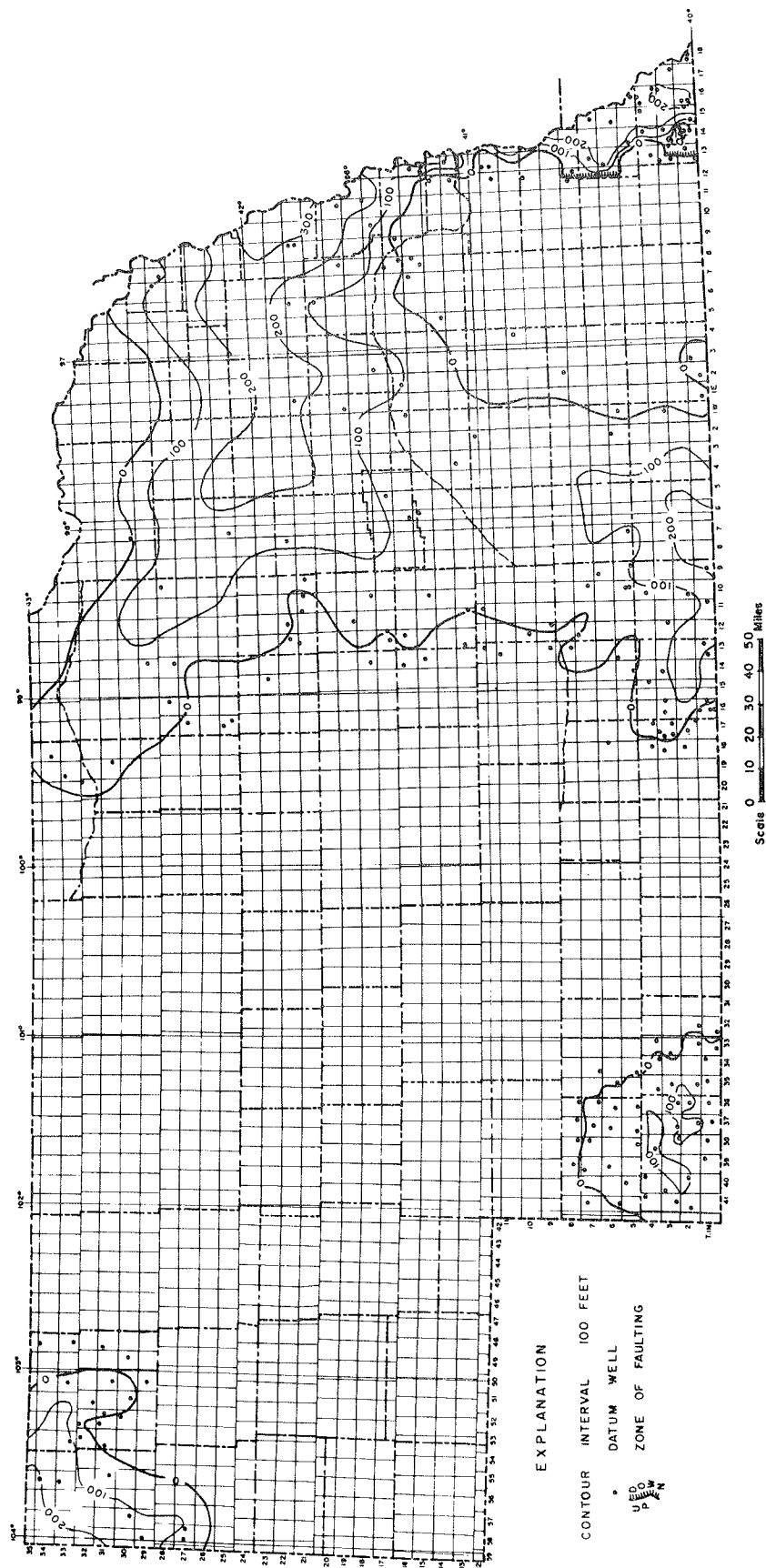
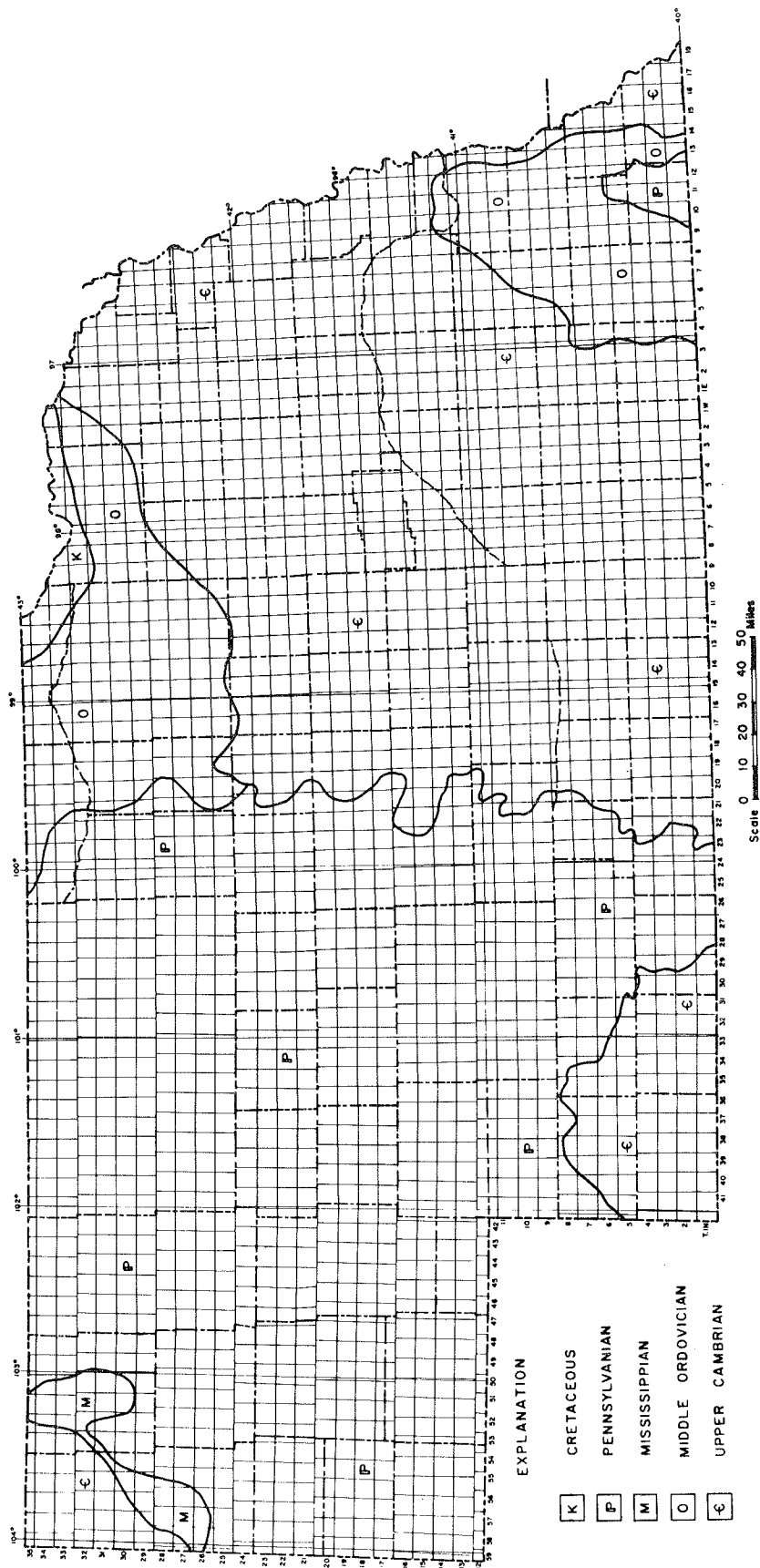


Figure 17

THICKNESS OF MISSISSIPPIAN

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EXPLANATION

- K CRETACEOUS
- P PENNSYLVANIAN
- M MISSISSIPPIAN
- O MIDDLE ORDOVICIAN
- E UPPER CAMBRIAN

Figure 18

SUPRAGEOLOGIC MAP OF THE PRECAMBRIAN SURFACE

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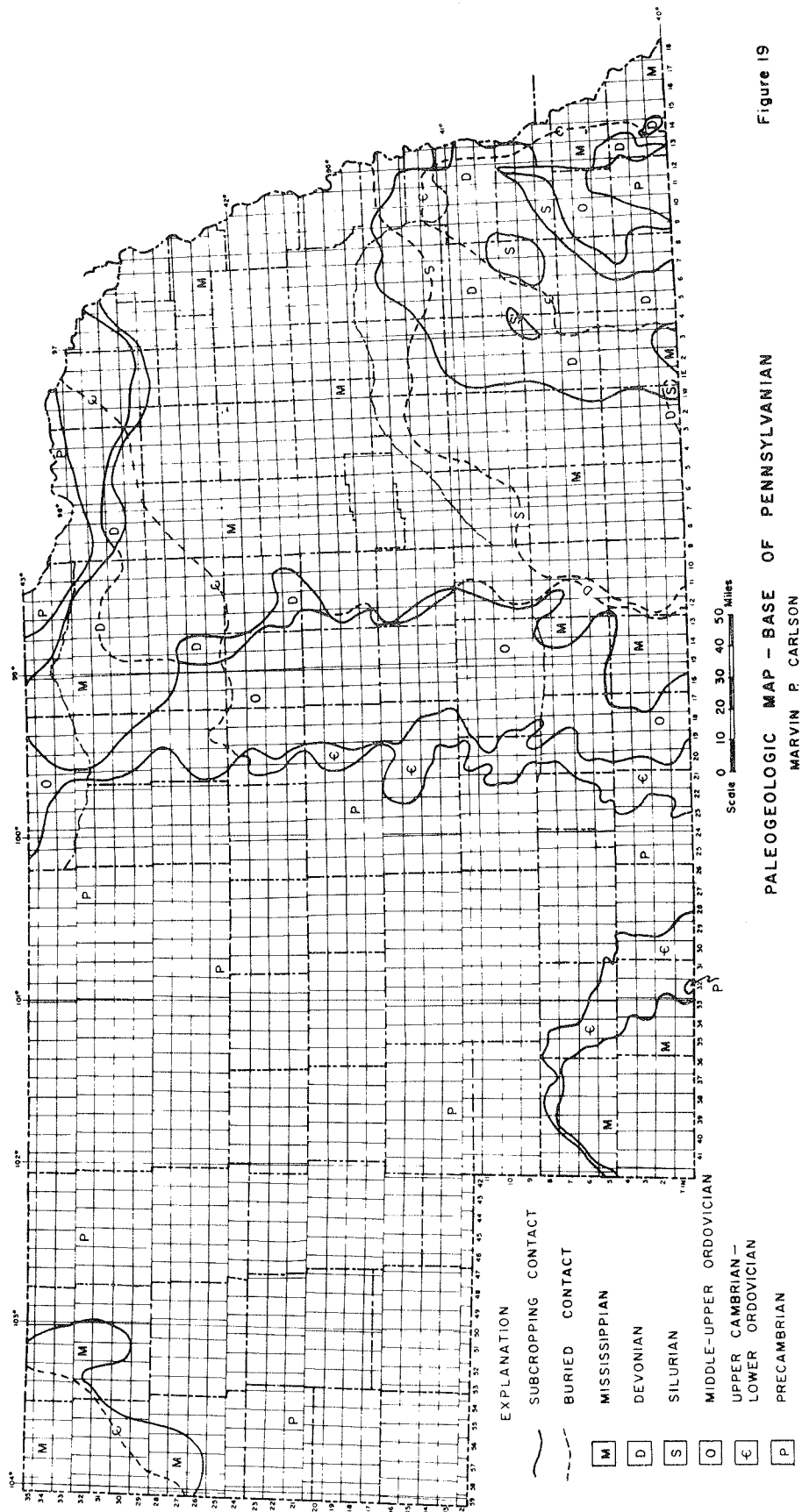


Figure 19